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Management of Risk Factors to Decrease Peanut Allergy Occurrences in the Youth Population

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Management of Risk Factors to Decrease Peanut Allergy Occurrences in the Youth Population:

An Integrated Review of Literature

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Abstract

Background: Recent increases in prevalence of peanut allergy has become a significant public health concern. There are many risk factors that have been determined to cause development of peanut allergies. These risk factors include genetics, race, sex, primary, and secondary prevention. Previous guidelines have given no evidence that preventing an infant from allergenic foods stunts development of peanut allergy.

Objectives: The purpose of this integrative literature review was to identify if early exposure to peanut prevents occurrence of peanut allergy development.

Method: An integrative literature review was conducted undergoing extensive search for studies that have focused on early exposure to peanut in the infant population from 2006 to 2017.

Results: Early exposure to high risk infants (infants with severe eczema, egg allergy, or both) between the ages of 4 and 11 months old, does prevent peanut allergy development. Follow up studies prove that avoiding peanuts for 12 months after, still prevent development of peanut allergy.

Conclusion: This review found evidentiary support for the fact that early exposure to high risk infants does prevent development of peanut allergy.

Keywords: peanut allergy, peanut, allergy, risk factors, management, maternal diet, prevention, siblings, and immunology.

Introduction

Background & Significance

Peanut allergy is a significant public health concern that can first occur at a young age, is rarely outgrown, and can produce severe enough reactions to cause death (Proudfoot & Saul, 2016). The prevalence of peanut allergies is growing among younger children. In Western countries, 1.4% to 3% of children have a peanut allergy (McCulloch, 2016). Prevalence may have tripled in countries like the United States which equates to about 100,000 new cases annually in the United States and United Kingdom (Fleischer et al., 2015). According to John Kelso, MD, Allergist in the division of Allergy, Asthma, and Immunology at Scripps Clinic in San Diego, children are not born with neither peanut allergies, nor are born with allergies in general. John Kelso stated, “children don’t inherit a specific allergy, but rather, a genetic tendency to develop allergic disease” (as cited in McCulloch, 2016). A peanut allergy can be prevented from occurring if the necessary management is taken early in a child’s life.

For the purpose of this literature review, the definition of peanut allergy is that peanuts are a part of the legume or soy family. The difference between a peanut and a tree nut is that a tree nut is a hard-shelled fruit from a tree (Proudfoot & Saul, 2016). The immunological nature of a peanut allergy is induced by peanut protein and the formation of IgE antibodies by a child’s immune system (Proudfoot & Saul, 2016). Peanut allergies are most always a type-1 hypersensitivity response which means that prior sensitization to peanut protein must occur to cause the formation of IgE antibodies (Tibbott & Clark, 2014). Prior sensitization can occur in utero through breast milk, in eczematous children through a compromised skin barrier, or through low-dose environmental exposure e.g. inhalation (Tibbott & Clark, 2014). Once the

peanut protein is in the body, the peanut antigen binds to T and B cells which forms the IgE antibodies. The IgE antibodies then bind to mast cells and basophils. Upon re-exposure to peanut protein, degranulation occurs which releases histamine, tryptase and leukotrienes (Tibbott & Clark, 2014). Typical physiologic response includes smooth muscle contraction, mucous secretion, vasodilation, and anaphylaxis (Tibbott & Clark, 2014).

According to Kim, “In past years, the American Academy of Pediatrics (AAP) and other professional groups recommended delaying the introduction of highly allergenic foods, such as egg, peanuts, tree nuts, and fish, for 1 to 3 years depending on the food” (2016). A shift in this thinking started in 2000 because observational studies have shown that early introduction to these foods may actually prevent allergy occurrences. Du Toit stated that, “A cross-sectional study of Israeli and UK Jewish children found that the prevalence of peanut allergy (PA) was 10-fold higher in the UK than in Israel” (2016). This could possibly be due to the fact that Israeli infants consume a peanut puff treat called Bamba. A landmark study done in 2006 and published in 2015 called Learning Early About Peanut Allergy (LEAP) identified that early exposure to peanuts in children more prone to allergy disease showed positive outcomes of the children not developing a peanut allergy (Hilton, 2017). Another study called the EAT trial studied food allergy prevalence in children with no risk of food allergy (du Toit, 2016). The outcomes of this study are vital in the understanding of the prevention of peanut allergies for children in the future.

Problem statement

According to the Centers for Disease Control and Prevention, food allergies increased dramatically to about 18% between 1997 and 2007 (Collins 2013). Until recently, the medical community set guide lines that recommended pregnant women avoid peanuts and other potential

allergens to suggesting that there are no limits on what pregnant women can eat to avoid food allergy (Collins, 2013). There is still confusion on whether these studies account for children with no history of allergy and whether or not mothers with a peanut allergy will pass this to their children. A major study was started in 2006 called the Learning Early About Peanut Allergy (LEAP) trial which tested highly susceptible infants to early exposure to peanuts. This is the main study that caused guild lines to be changed about early exposure to allergy prone foods. There is a need for more research to be done on the genetic component of allergy disease, if early intervention completely reduces the chance of developing a peanut allergy, as well as how patient education plays a role in proposing these new guild lines.

Purpose statement

The purpose of this literature review was to (a) explore the most current studies on early exposure to peanuts and determine if current guidelines on early exposure will prevent the development of peanut allergy in children and (b) to see if there is a genetic component to allergy disease and later development of peanut allergy. Infants between the ages of 4-11 months will be studied. Children older than the age of ten years will not be examined. This research can help when teaching new mothers about their child's nutrition. In order for new mothers to understand the management of risk factors to prevent a peanut allergy occurrence, it is essential to understand how food allergies arise. Analyzing previous studies and research will allow for cohesive evidence on if mothers should expose their children early to peanuts.

Upon analysis of the literature there will be a better understanding of how early exposure can prevent development of peanut allergy, as well as if this early exposure will prevent the allergy from developing or postpone the development from developing. Accumulating all of the literature on early exposure will provide better guidelines on early peanut exposure for infants.

Research Questions

The following research questions are addressed in this literature review:

1. Does early introduction of peanut protein reduce and prevent the prevalence of peanut allergy in children?
2. How does immunity play a role in allergy disease and later development of peanut allergy?

Conceptual Framework

The nurse's role in managing risk factors to prevent peanut allergies comes in the form of patient education. Patient education should center around primary and secondary prevention of food allergy. The Health Belief Model (HBM) is a framework that takes into consideration an individual's behavior towards their own health (Becker et al., 1978). In the Health Belief Model, whether or not a person undertakes a recommended health action depends on his or her perception of the threat of illness, the health action's potential benefits or efficacy in preventing or reducing susceptibility or severity, or both, and physical, psychological, financial, and other barriers or costs related to initiating or continuing the advocated behavior (Becker et al., 1978). Originally, the HBM focused on preventative actions and avoidance of the threat of disease. Now, it has been expanded to help explain compliance to medical regimens after a diagnosis has been made (Becker et al., 1978). It has been previously stated that avoidance of possible allergy prone foods, like peanuts, be followed for the first 1 to 3 years (Kim, 2016). This belief has now been changed since 2015, due to new research studies.

The Health Belief Model, along with current research will help educate patients on the prevention of possible peanut allergies. The new knowledge gained from the LEAP, EAT, and LEAP-ON studies will change the belief that peanuts should be avoided within the first few

months of life, and that early exposure has a high chance of limiting the susceptibility of a child developing an allergy to peanuts. This will hopefully diminish the occurrence in the future.

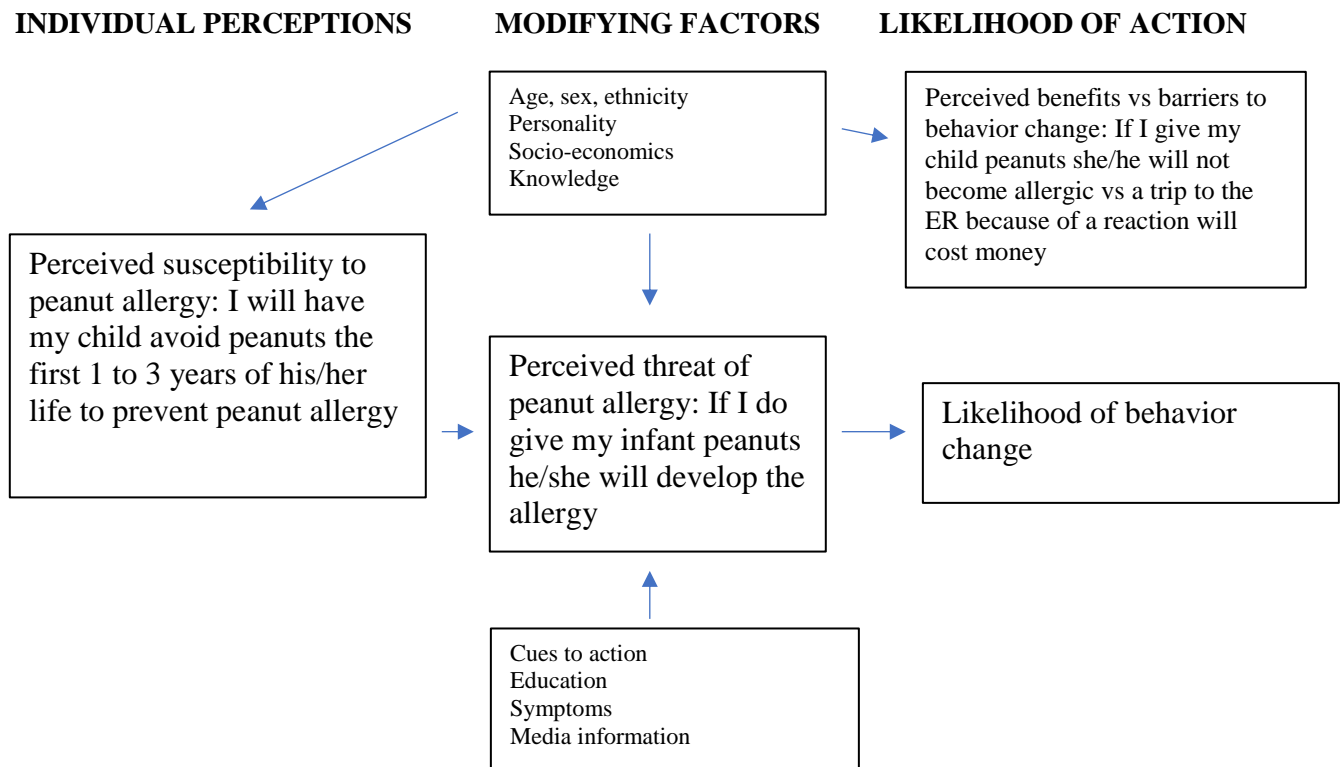


Figure 1: Health Belief Model on Peanut Allergy with Nursing Protocol Implementation

Figure 1 shows a theoretical model of a patient's prior belief of early exposure to peanuts.

Methods

Research Design

An integrative literature review was used to analyze the studies done on peanut allergy prevention in the youth population. This review focused on the interventions and outcomes of early exposure to peanut protein in high risk and no risk youth populations. A brief review of allergy development in siblings of those with a peanut allergy was conducted, as well as brief understanding of IgE antibodies and their role in peanut allergy development. Literature on children older than the age of 10 years with a peanut allergy was not be explored, nor was the development of adult allergic response to peanuts. Extensive review on other food allergy development will not be included. This analysis will provide evidence-based information that can be used to help mothers understand the importance of introducing their infants to peanut protein within the first months of life. The steps established by Whittmore and Knafl (2005) for writing a literature review were used to gather and analyze data in the literature that was found. An integrative review of the literature provides the most accurate information about peanut allergy prevention studies that have recently changed previous guidelines on what foods to expose an infant early in life.

Literature Search Strategies

A computerized search of the literature was performed using DePaul University, as well as Rosalind Franklin University of Medicine and Science databases. PubMed and Cumulative Index to Nursing and Health Literature (CINAHL) were both used to find relevant literature. When using these databases, various text combinations were used for each base. The following key words were used in each search: *peanut allergy, peanut, allergy, risk factors, management, maternal diet, prevention, siblings, and immunology*.

Literature Search Limitations and Inclusion/Exclusion Criteria

Inclusion criteria: The reviewed sources were limited to full text, peer reviewed articles from as early as January 2006; articles must be in English; the article must only have research done with human subjects; article studies were not limited to the United States.

Exclusion criteria: For the purpose of this literature review, only studies done on humans were reviewed. Articles that studied children above the age of ten years old were not included.

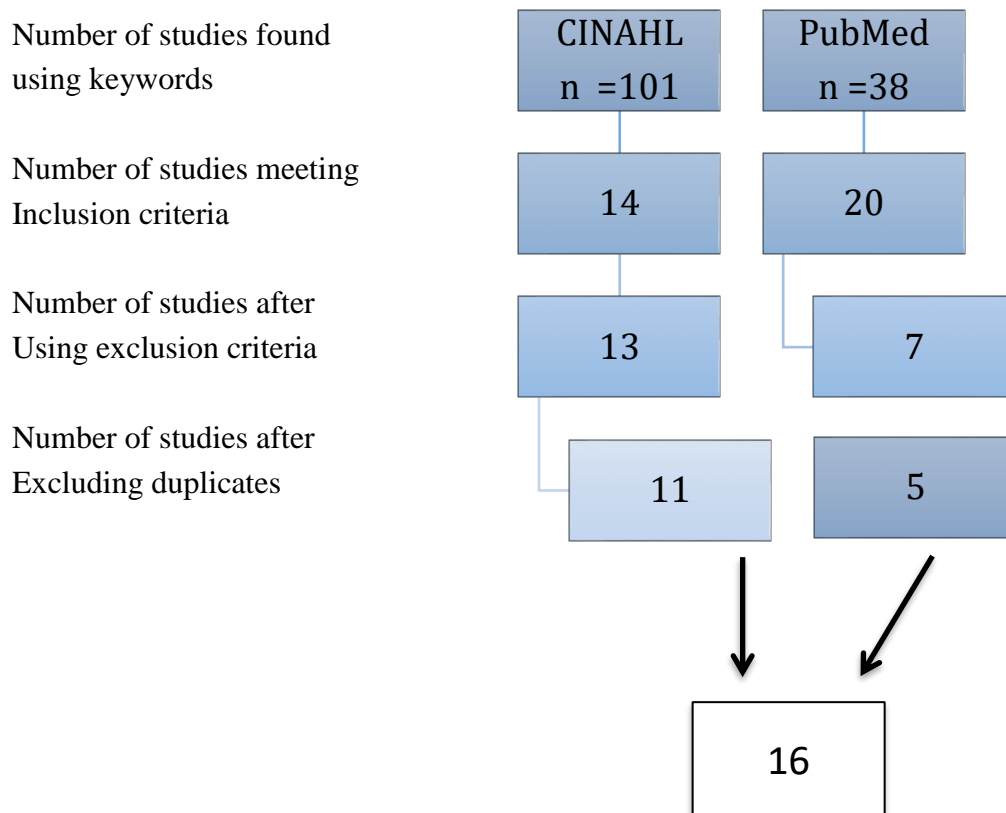


Table 1: Study Selection & Review of Peanut Allergy Prevalence and Prevention

Data Synthesis and Analysis

All of the data collected from Cumulative Index to Nursing and Health Literature (CINAHL) and PubMed were organized into a table based on key words used in the searches. Three searches were done to gather all significant data. Table 1 highlights articles found that include risk factors, prevention, management, and immunology with regards to peanut allergy. Many of the articles found within both databases were duplicates. Articles about peanut allergy discussed multiple factors including a brief overview of the immune response in the body, early exposure, and outcomes of early exposure.

To address the research questions, articles were chosen based on inclusion criteria of risk factors and prevention of peanut allergy. Research containing both key words were represented multiple times. Searches were done in both databases so the most accurate information and studies were found. A total of 101 articles were found using the CINAHL database, and 38 articles were found from PubMed databases. From this initial number, a total of 34 articles specifically met the inclusion criteria. After incorporating the exclusion criteria to this search, a total of 20 articles were chosen. Four articles in both database searches were duplicated within the search, and were therefore excluded.

The second question for this research focused on genetic susceptibility of developing a peanut allergy. For this to be answered, peanut allergy and immunology articles were chosen. A brief understanding of allergic components in the body will provide better understanding of development of peanut allergy in infants that are more susceptible, as well as genetic susceptibility of siblings of those infants who are allergic to peanut.

The final process of this analysis focused on determining if early exposure studies prevented occurrences of peanut allergy in infants who are susceptible to peanut allergy, if a

genetic component makes an infant more susceptible to peanut allergy, and if siblings will also develop an allergy to peanuts.

Results

To understand how to prevent development of peanut allergy, understanding of causative factors needs to be established. Genetic factors are important, but the dramatic increase in peanut allergy within a short span of time shows that genetics is not the only factor. Other non-modifiable risk factors include race and sex. Modifiable risk factors take into account primary and secondary prevention (Du Toit et al., 2016). Primary prevention seeks to prevent the onset of IgE sensitization. This targets people without a known peanut allergy (Du Toit et al., 2016). Secondary prevention aims to interrupt the development of peanut allergy in IgE sensitized children. These are children with allergen-specific IgE or who show a reaction on a skin prick test (Du Toit et al., 2016). The Learning Early About Peanut Allergy (LEAP) trial tested to see if primary and secondary prevention will decrease the prevalence of peanut allergy in infants.

Learning Early About Peanut Allergy (LEAP) Trial

To examine if early exposure to peanuts prevents development of peanut allergy in infants, a study called the LEAP trial was done. Development of the LEAP trial was founded on the knowledge that peanut allergy development was 10 times more likely in Jewish children living in the United Kingdom, than Israeli children who have a similar background (Du Toit et al., 2015). Clinical practice guidelines in the United Kingdom in 1998 and the United States in 2000 recommended that infants should avoid allergenic foods, such as peanuts, within the first months of life, and from the diets of mothers during pregnancy and lactation (Du Toit et al., 2015).

The LEAP trial focused on infants with a high risk of allergy disease (infants with severe eczema and/or egg allergy) (Hilton, 2017). Du Toit et al. explains, “The primary outcome of this study was the proportion of participants with peanut allergy at 60 months of age”. The study was a randomized, open-label, controlled trial conducted in the United Kingdom (Du Toit et al., 2015). Eligible infants for enrollment must be at least 4 months old and less than 11 months of age. Infants must also have a history of severe eczema, egg allergy, or both (Du Toit et al., 2015). These high-risk infants were stratified into one of two groups; no wheal after a skin prick test to test for peanut allergy or 1-4mm diameter measure after skin prick test to test for peanut allergy. Infants were then randomly assigned to consume or avoid peanut products until 60 months of age. The consumption group infants were fed at least 6 g of peanut protein per week until they reached 60 months of age. Peanut protein was provided in the form of Bamba, which is an Israeli peanut butter puffed maize snack for infants. This snack contains approximately 50% peanut protein (Hindley et al., 2017). The avoidance group were told to avoid consumption of peanut products until infants were 60 months old. Adherence to this regimen was assessed using food frequency questionnaires. Clinical assessments were also done at baseline, and at the ages of 12, 30, and 60 months of age. Phone consultations were conducted weekly between visits until infants reached 12 months of age, every two weeks from ages 12 months to 30 months, and every month thereafter (Du Toit et al., 2015).

The outcomes of this study revealed positive results. Of the 530 infants with a negative skin prick test at baseline, 13.7% of the infants who avoided peanuts until 60 months of age tested allergic to peanuts, and only 1.9% of infants who consumed peanuts until 60 months of age tested allergic to peanuts (Du Toit et al., 2015). The 98 infants who tested positive with a skin prick test at baseline were also examined at 60 months old. Of the 98 infants who avoided

peanuts tested positive for a peanut allergy, 35.3% tested positive for peanut allergy and 10.6% of infants who consumed peanuts until 60 months of age tested allergic to peanuts. There is now scientific evidence that health care providers should now recommend that infants be exposed to allergy prone foods early in life (Fleischer et al., 2015). The LEAP trial shows that early peanut intervention can greatly reduce the number of infants who will develop a peanut allergy. Some limitations were that the LEAP trial only tested high risk infants. Low risk infants or infants with wheal diameters larger than 4mm at baseline skin prick testing were not included (Du Toit et al., 2015). There was also no placebo used, and only oral forms of early introduction were used. Peanut dust or inhalants were not included. This monumental study provided enough scientific evidence to change guide lines about early exposure to peanut for infants, and shows that peanut allergy prevalence can be reduced.

Persistence of Oral Tolerance to Peanut (LEAP-ON) Study

One of the other limitations of the LEAP trial was that infants were only tested at 60 months of age. The Persistence of Oral Tolerance to Peanut (LEAP-ON) study wanted to examine if the participants in the LEAP trial remained protected against peanut allergy after cessation of peanut ingestion for 12 months, or if they lost the immunological protection (Du Toit et al., 2016). The primary outcome for the LEAP-ON study was the proportion of participants who develop a peanut allergy after avoiding peanuts for 12 months (Du Toit et al., 2016).

The participants of the LEAP-ON study were chosen from the participants in the primary trial who were assessed for developing a peanut allergy at 60 months old. Participants were enrolled from 2011 to 2014. Of these previous participants, 550 would be included in the follow-up study. 280 participants were instructed to avoid peanuts for 12 months, and 270 participants

were instructed to consume peanut products for 12 months. Adherence for the peanut consumption group was “consumption of 2 g or less of peanut on no more than 6 occasions (maximum of once per month); consumption of 1 g of peanut or less on no more than 12 occasions (maximum of twice per month); and a cumulative ingestion of no more than 18 g of peanut” (Du Toit et al., 2016).

Results from the LEAP-ON study showed that at 72 months of age, among the 550 participants, 18.6% of the participants who avoided peanuts for 12 months had a peanut allergy at 72 months old, and 4.8% of the participants who continued to consume peanuts developed a peanut allergy at 72 months (Du Toit et al., 2016). While these results did show that participants in both parties can develop a peanut allergy, it is far less likely in the group that continued to consume peanuts than in the group that avoided peanuts.

Immunologic Assessments in LEAP Trial and LEAP-ON Study

Peanut allergy reactions are caused by IgE mediated, type-1 hypersensitivity response (Tibbott & Clark, 2014). Prior sensitization to peanuts causes the formation of IgE antibodies (Tibbott & Clark, 2014). Sensitization can occur in utero, through breast milk, in eczematous children through a compromised skin barrier, or through low-dose environmental exposure (inhalation) (Tibbott & Clark, 2014). IgE antibodies are produced when the body perceives a threat. The Ara h 1,2,3, and 6 specific IgE are major components of a peanut allergy, and the presence of Ara h 2-specific IgE is responsible for primary peanut allergy with possibly lethal results (Tibbott & Clark, 2014).

IgE, IgG, and IgG4 markers were tested at baseline on infants who participated in the LEAP trial. Skin prick tests were done to measure diameter of the wheal, with the lowest value being 1mm and upper limit being 4mm in diameter (Du Toit et al., 2015). Throughout the trial,

immune makers and skin prick diameters were measured at 12, 30, and 60 months of age. Results showed that wheal size increased only in the peanut avoidance group (Du Toit et al., 2015). Levels of IgE increased in both groups, however, a significant rise in serum IgE levels was measured in the peanut avoidance group when re-exposed to peanuts (Du Toit et al., 2015).

In the LEAP-ON study, similar results were found. The mean Ara h2-specific IgE levels declined significantly in the group of participants who consumed peanuts (Du Toit et al., 2016). This information can guide further researchers to better understand how allergy and specific immunoglobulins can affect peanut allergy development in infants.

Sibling Risk of Developing Peanut Allergy

One of the many questions parents ask if one of their children is found allergic to peanuts is whether there is an increased risk for their other children to develop a peanut allergy. The Study of Asthma, Genes, and the Environment (SAGE) project sought to determine if younger siblings of peanut allergic children should be tested for potential development of peanut allergy. Approximately 14,000 Canadian children were used in this study done in 1995 (Liem et al., 2008). A child health and home environment questionnaire was sent out and had questions pertaining to presence of asthma, food allergy and other atopic conditions (Liem et al., 2008). Skin testing to peanut and serum lab values of IgE were performed on 603 children. A Sibling Food Allergy survey was sent to 560 of the 603 children, and 92% (n=514/560) of families completed the survey (Liem et al., 2008). Of these 514 children, 450 were not allergic or sensitized to peanut (child can eat peanuts and has a negative skin prick test). 29 children were defined as peanut allergic, 8 were sensitized but not allergic, and 27 did not have siblings (Liem et al., 2008). The odds ratio of a child who is allergic to peanuts having a sibling who is also allergic is 7.12, and the odds ratio of a younger sibling also having a peanut allergy is 11.76.

This study revealed that a sibling of a peanut allergic child has a dramatic increase in developing a peanut allergy. Their risk is nearly 7% higher of developing an allergy than those who do not have a sibling with a peanut allergy. These results along with other studies done by Emmett and colleagues, Hourihane and colleagues, and Sicherer and colleagues will help educate parents on how to prevent development of peanut allergy in their children. (Liem et al., 2008).

Discussion

Genetics, race, sex, and primary and secondary prevention are all risk factors that can contribute to a developed peanut allergy. Although genetics, race, and sex cannot be changed, factors like primary and secondary prevention can dramatically decrease the chance that a child develops an allergy to peanuts. Primary prevention can begin with a health care provider informing new parents of the updated research about early exposure to peanuts. A provider can also suggest early allergy screening for children. With data collected from the LEAP and LEAP-ON studies, it can be inferred that early exposure to highly allergenic foods, such as peanuts, provides better outcomes of not developing an allergy than it would if these foods were avoided early in life. With this information, the rise in peanut allergies should decrease over time.

It is important to note that there is still research being done on genetic factors and the development of peanut allergies. Along with this is the question of whether maternal or paternal peanut allergy will cause the child to develop an allergy, as well, since the peanut product will most likely be avoided in the household. There is also question of whether sibling development of a peanut allergy will cause the other children to be at a higher risk of developing the same allergy.

Limitations

Because this was a literature review, many sources were used to collect data on this research topic. The most prominent limitation were the studies population sizes, reliability of the families to adhere to the study protocols, limitation of different races and ethnicities that participated, and time length of studies. Further research on the families who participated in the studies, as well as, other studies on a new population but with the same parameters of the LEAP and LEAP-ON study would be helpful in confirming the results.

Direction for Future Research

There are many different tangents from the original LEAP study that could be further researched. Other research studies could focus more on the genetic factor for development of peanut allergy, as well as if parental or sibling allergy will play a part in how peanut allergies develop in families. There is also the question of whether a mother can consume peanut products while breastfeeding, and if there is an effect of developing a peanut allergy through that route.

Nursing Implications

Technology, research, and the internet are greatly changing the world of medicine and nursing. Many people, turn to the internet or others for medical advice. Thus, the most important nursing implication for this study is nursing awareness towards patient education and health promotion. A nurse should use patient centered care when working with children and their families. Many times, new parents turn to parenting books or others for advice on how to parent their child. As a nurse, the most current research should be used when giving advice or educating parents on what is best for their child, in regard to early exposure to peanut products. These two studies have shown that early exposure can greatly reduce the chance that a child will develop a peanut allergy. A nurse should be able to use this information in summation to educate new parents. Nurses should also be able to recognize and work with parents who are more skeptical to

this new research. It is always best to stay current on new research, especially when engaging in patient education.

Conclusion

The most important nursing implication for this study is nursing awareness towards patient education and health promotion. One of the roles of a nurse is to provide patient education in order to maintain and promote health. While there is more extensive research that needs to be done with regard to the genetic factors of the development of peanut allergies, researchers who published the LEAP and LEAP-ON study have shown that early intervention of exposure to peanuts can greatly reduce the development of the allergy. Recognizing that some parents might be reluctant to change with this new research is also an important nursing implication. Nurses must stay current when teaching patients about new information. There are many resources that nurses can provide to parents to ease this tension and develop trust among their patients.

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Table 1: Research Matrix

Author & Year	Sample Size	Study Design & Purpose	Essential Components	Study Outcome
Du Toit, G., Roberts, G., Sayre, P. H., Bahnson, H. T., Radulovic, S., Santos, A. F., ... Lack, G. (2015).	N= 640 infants with severe eczema, egg allergy, or both	Randomized, open-label, controlled trial conducted at a single site in the United Kingdom. Open-label was chosen because participants and their parents were aware of the group they were assigned to.	640 infants with severe eczema, egg allergy, or both were chosen based on baseline skin prick tests to test for allergy to peanut protein. Infants were then either instructed to consume or avoid peanut products until 60 months of age.	Of the 640 infants, 617 were able to participate in the final results at 60 months old. Infants were given 5 g of peanut protein in one sitting. 530 infants with a negative result on baseline tests were evaluated. 13.7% were allergic if avoided peanuts and 1.9% were allergic if consumed peanuts. Of the 98 who tested positive at baseline, 35.3% were allergic if avoided peanuts, and 10.6% were allergic if consumed peanuts
Toit, G. D., Sayre, P. H., Roberts, G., Sever, M. L., Lawson, K., Bahnson, H. T., & ... Du Toit, G. (2016)	N=556 of the 628 eligible participants from the primary trial (LEAP trial)	A follow-up study	This follow-up study used participants in the LEAP trial to test whether a 12 month period of avoidance or consumption	Allergy was determined by oral peanut ingestion at 72 months of age. At 72 months, 18.6% of the peanut

			would cause development of peanut allergy. Primary outcome was the percentage of participants with peanut allergy after 12 months of peanut avoidance.	avoidance group (52 of 280 participants) and 4.8% of the peanut consumption group (13 of 270) had a peanut allergy.
Hindley, J. P., Filep, S., Block, D. S., King, E. M., & Chapman, M. D. (2017)	N=16 (100mg) samples of different lots of Bamba from either the United Kingdom (n=8) or the United States (n=8) N= 25 from a single lot	Bamba products were tested using ELISA for Ara h1, Ara h2, and Ara h6.	The preferred peanut snack used in the LEAP trial was Bamba, so the allergen composition of Bamba, and what levels of specific peanut allergens are associated with tolerance to peanut were studied	Bamba is a well-formulated peanut product, with each of the 3 major allergens present in uniform amounts. The estimates obtained from this study suggest that cumulative weekly doses of approximately 330 mg specific peanut allergens are associated with prevention of peanut allergy

Author & Year	Study Design	Study Purpose	Essential Components	Outcomes
Coleman Collins, S. (2013)	Descriptive study. Summarized maternal diet, infant and early exposure feeding, and practice pearls.	This article focused on recommendations for maternal diet, and what guidelines said to avoid eating while pregnant.	Content includes a focus on maternal diet, breast feeding and early child and infant feeding. Discusses how	States researchers have not been able to determine the exact etiology of food allergies, which is one of the reasons food

			allergenic protein may be secreted in breast milk which is an infant's first exposure to allergenic proteins.	allergy has increased. Highlights the need for further research on maternal diet influences and early exposure to allergenic foods. Also states that while guidelines on early exposure to allergenic foods has been published, physicians are still going by previous standards.
Du Toit, G., Tsakok, T., Lack, S., & Lack, G. (2017).	Comparative descriptive design	Discusses how to prevent food allergy. Mentions risk factors, such as genetics, family history of food allergy, male sex, ethnicity, and atopic dermatitis.	Discusses several components of food allergy development. Nonmodifiable risks include genetics, race, and sex, while modifiable risks include primary and secondary prevention. Primary prevention is preventing the onset of IgE sensitization, and secondary prevention is interrupting the development of food allergy in IgE sensitized children.	This article summarizes risk factors of food allergy, and the LEAP trial. It also goes into detail about specifics of the LEAP trial, such as the infant population and being high risk infants, the excluded children in the LEAP trial, if the LEAP trial will sustain peanut allergy development, if other children around the world will have same results, and if this type of prevention will

				result in other food allergens
Fleischer, D. M., Sicherer, S., Greenhawt, M., Campbell, D., Chan, E., Muraro, A., ... Rosenwasser, L. (2017)	This article summarizes the evidence of the LEAP trial.	Provides further support of the LEAP trial and the conclusions made.	Purpose of this article was to highlight emerging evidence for existing allergy prevention guidelines. It summarizes the evidence, and gives explanation of why health care providers should recommend these new guidelines	Outcomes of this article are to inform the reader that the LEAP trial has changed previous guidelines.
Hilton, L. (2017).	Summary of LEAP trial, with dermatologist insights	Uses other health care provider insight to the LEAP trial results	Clearly summarizes the LEAP trial. Provides dermatologist insights.	States that there might be discrepancies in the definition of severe eczema between pediatricians and dermatologists. Gives Dr. Peter Lio, assistant professor of clinical dermatology and pediatrics, Northwestern University Feinberg School of Medicine, insight as to be cautious about this new study
Jae H., K. (2016).	This article summarizes different nutritional insights and	The purpose of this article is to give information on preventing allergy and looks into why	Mentions how infants with atopic dermatitis are more susceptible to develop food	Support for the LEAP trial

	pediatric nutrition.	previous guidelines were changed about early exposure to highly allergenic foods.	allergies. Discusses the LEAP trial	
McCulloch, M. (2016).	Summary of LEAP trial, LEAP-ON study, and new guidelines	Purpose is to educate readers on why new guidelines have arisen.	Gives tips on how to expose infants early to peanuts. Discusses need for further research on trial with infants who are not of the high risk population	Proposes ideas for further research
Proudfoot, C., & Saul, P.	Informational summary on allergy development, peanut and tree nut allergies, and management of these allergies	Purpose is to educate readers on peanut allergy and management	Discusses prevalence, allergy mechanisms, presentation of allergy, importance of history taking and physical, and management strategies to prevent reaction	Patient education
Tibbott, R., & Clark, A. (2014).	Descriptive summary	Purpose is to condense information on allergy development in the body, presentation and diagnosis of peanut allergy, and what determines the severity of a reaction	Breaks down how allergy is developed in the body. Gives good information on the fact that the amount of peanut protein consumed can determine severity of the reaction	Patient education on peanut allergy and management. Focus on need for other factors such as sleep and illness and how these can affect severity of a reaction.

Table 2: Literature sources for risk factors, prevention, management, and immunology with regards to peanut allergy.